

$\Delta(2420) 11/2^+$

$$I(J^P) = \frac{3}{2}(\frac{11}{2}^+) \text{Status: } ****$$

Most of the results published before 1975 are now obsolete and have been omitted. They may be found in our 1982 edition, Physics Letters **111B** 1 (1982).

NODE=B084

NODE=B084

### $\Delta(2420)$ BREIT-WIGNER MASS

NODE=B084M

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>2300 to 2500 (<math>\approx 2420</math>) OUR ESTIMATE</b>			
2633 $\pm$ 29	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2400 $\pm$ 125	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
2416 $\pm$ 17	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
2400 $\pm$ 60	HENDRY	78	MPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
2400	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$
2358.0 $\pm$ 9.0	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$

NODE=B084M

→ UNCHECKED ←

### $\Delta(2420)$ BREIT-WIGNER WIDTH

NODE=B084W

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>300 to 500 (<math>\approx 400</math>) OUR ESTIMATE</b>			
692 $\pm$ 47	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
450 $\pm$ 150	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$
340 $\pm$ 28	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$
460 $\pm$ 100	HENDRY	78	MPWA $\pi N \rightarrow \pi N$
● ● ● We do not use the following data for averages, fits, limits, etc. ● ● ●			
400	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$
202.2 $\pm$ 45.0	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$

NODE=B084W

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### $\Delta(2420)$ POLE POSITION

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#### REAL PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>2260 to 2400 (<math>\approx 2330</math>) OUR ESTIMATE</b>			
2529	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
2300	<sup>1</sup> HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
2360 $\pm$ 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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#### −2×IMAGINARY PART

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
<b>350 to 750 (<math>\approx 550</math>) OUR ESTIMATE</b>			
621	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
620	<sup>1</sup> HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
420 $\pm$ 100	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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### $\Delta(2420)$ ELASTIC POLE RESIDUE

NODE=B084220

#### MODULUS $|r|$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
33	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
39	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
18 $\pm$ 6	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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#### PHASE $\theta$

VALUE (°)	DOCUMENT ID	TECN	COMMENT
−45	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$
−60	HOEHLER	93	ARGD $\pi N \rightarrow \pi N$
−30 $\pm$ 40	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$

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**$\Delta(2420)$  DECAY MODES**

The following branching fractions are our estimates, not fits or averages.

Mode	Fraction ( $\Gamma_i/\Gamma$ )
$\Gamma_1$ $N\pi$	5-15 %
$\Gamma_2$ $\Sigma K$	

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DESIG=2

 **$\Delta(2420)$  BRANCHING RATIOS**

$\Gamma(N\pi)/\Gamma_{\text{total}}$	DOCUMENT ID	TECN	COMMENT	$\Gamma_1/\Gamma$
<b>5 to 15 OUR ESTIMATE</b>				
8.5±0.8	ARNDT	06	DPWA $\pi N \rightarrow \pi N, \eta N$	
8 ±3	CUTKOSKY	80	IPWA $\pi N \rightarrow \pi N$	
8.0±1.5	HOEHLER	79	IPWA $\pi N \rightarrow \pi N$	
11 ±2	HENDRY	78	MPWA $\pi N \rightarrow \pi N$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
22	CHEW	80	BPWA $\pi^+ p \rightarrow \pi^+ p$	

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NODE=B084R1

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→ UNCHECKED ←

$(\Gamma_i\Gamma_f)^{1/2}/\Gamma_{\text{total}}$ in $N\pi \rightarrow \Delta(2420) \rightarrow \Sigma K$	DOCUMENT ID	TECN	COMMENT	$(\Gamma_1\Gamma_2)^{1/2}/\Gamma$
VALUE				
-0.016	CANDLIN	84	DPWA $\pi^+ p \rightarrow \Sigma^+ K^+$	

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NODE=B084R2

 **$\Delta(2420)$  FOOTNOTES**

<sup>1</sup> See HOEHLER 93 for a detailed discussion of the evidence for and the pole parameters of  $N$  and  $\Delta$  resonances as determined from Argand diagrams of  $\pi N$  elastic partial-wave amplitudes and from plots of the speeds with which the amplitudes traverse the diagrams.

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NODE=B010;LINKAGE=H9

 **$\Delta(2420)$  REFERENCES**

ARNDT	06	PR C74 045205	R.A. Arndt <i>et al.</i>	(GWU)
HOEHLER	93	$\pi N$ Newsletter 9 1	G. Hohler	(KARL)
CANDLIN	84	NP B238 477	D.J. Candlin <i>et al.</i>	(EDIN, RAL, LOWC)
PDG	82	PL 111B 1	M. Roos <i>et al.</i>	(HELS, CIT, CERN)
CHEW	80	Toronto Conf. 123	D.M. Chew	(LBL) IJP
CUTKOSKY	80	Toronto Conf. 19	R.E. Cutkosky <i>et al.</i>	(CMU, LBL) IJP
Also		PR D20 2839	R.E. Cutkosky <i>et al.</i>	(CMU, LBL)
HOEHLER	79	PDAT 12-1	G. Hohler <i>et al.</i>	(KARLT) IJP
Also		Toronto Conf. 3	R. Koch	(KARLT) IJP
HENDRY	78	PRL 41 222	A.W. Hendry	(IND, LBL) IJP
Also		ANP 136 1	A.W. Hendry	(IND)

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REFID=51535

REFID=43821

REFID=40339

REFID=41167

REFID=31151

REFID=30064

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REFID=30058

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REFID=30901